Vol. XI DECEMBER, 1900 No. 12

THE

NATIONAL GEOGRAPHIC MAGAZINE

CONTENTS

PAGE

THE WYOMING FOSSIL FIELDS EXPEDITION OF JULY, 1899
With illustrations.....WILBUR C. KNIGHT 449

GOLD IN THE PHILIPPINES.....F. F. HILDER 465

THE TEACHING OF PHYSICAL GEOGRAPHY IN ELEMENTARY SCHOOLS.....RICHARD E. DODGE 470

GEOGRAPHY AT THE BRITISH ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE..... 475

DECISIONS OF THE U. S. BOARD ON GEOGRAPHIC NAMES..... 478

SOME SIGNIFICANT FACTS CONCERNING THE FOREIGN TRADE OF GREAT BRITAIN..... 480

WASHINGTON

PUBLISHED FOR THE NATIONAL GEOGRAPHIC SOCIETY

BY McCLURE, PHILLIPS & CO.,

141–155 E. 25TH STREET, NEW YORK, AND 107 CORCORAN BUILDING, WASHINGTON

Price 25 Cents REPRINT **$2.50 a Year**

THE

National Geographic Magazine

AN ILLUSTRATED MONTHLY

Editor: JOHN HYDE,
Statistician of the U. S. Department of Agriculture

Associate Editors

GENERAL A. W. GREELY,
Chief Signal Officer, U. S. Army

W J McGEE,
Ethnologist in Charge, Bureau of American Ethnology

HENRY GANNETT,
Chief Geographer, U. S. Geological Survey

C. HART MERRIAM,
Chief of the Biological Survey, U. S. Department of Agriculture

DAVID J. HILL,
Assistant Secretary of State

ELIZA RUHAMAH SCIDMORE,
Author of "Java, the Garden of the East," etc.

MARCUS BAKER,
U. S. Geological Survey

WILLIS L. MOORE,
Chief of the Weather Bureau, U. S. Department of Agriculture

H. S. PRITCHETT,
Superintendent of the U. S. Coast and Geodetic Survey

O. P. AUSTIN,
Chief of the Bureau of Statistics, U. S. Treasury Department

CHARLES H. ALLEN,
Governor of Porto Rico

CARL LOUISE GARRISON,
Principal of Phelps School, Washington, D. C.

GILBERT H. GROSVENOR, *Washington, D. C.*

SPECIAL MAPS

PUBLISHED BY THE

National Geographic Magazine

Map of Alaska (28 x 24 inches). Vol. IX, No. 4.

Chart of the World on Mercator's Projection (48 x 27 inches). Vol. VII, No. 3.

Map of South Africa (46 x 33 inches). Vol. X, No. 12.

Map of the Chinese Empire, Japan, and the Russian-Manchurian Railway (11 x 7½ inches). Vol. XI, No. 8.

Twelve Maps on the Alaskan Boundary Dispute. Vol. X, No. 11.

Map of Cuba (18 x 7½ inches). Vol. IX, No. 5.

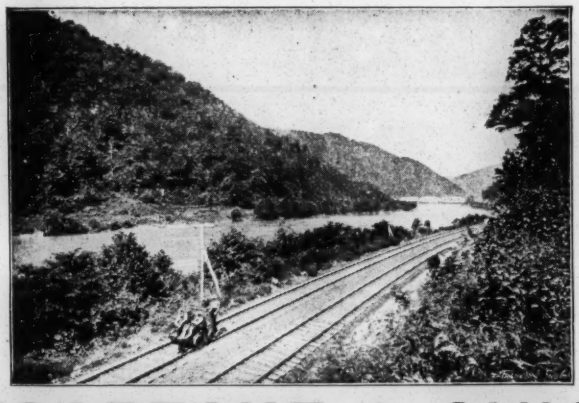
Twenty-five Full-page Charts, showing storm tracks and methods of weather forecasting. Vol. VIII, No. 3.

Map of Northeastern China (36 x 28 inches). Vol. XI, No. 9.

By Mail for 25 Cents Each

CORCORAN BUILDING : : : WASHINGTON, D. C.

Entered at the Post-office in Washington, D. C., as Second-class Mail Matter.



CHESAPEAKE & OHIO RY.

THE F. F. V. LIMITED is one of the finest trains hauled over any railway track in America. It runs solid between Cincinnati and New York, the route from Washington being over the Pennsylvania system. It has every modern convenience and appliance, and the dining-car service has no superior if it has an equal. The road-bed is literally hewed out of the eternal rocks; it is ballasted with stone from one end to the other; the greater portion is laid with one-hundred-pound steel rails, and although curves are numerous in the mountain section, the ride is as smooth as over a Western prairie.

One of the most delightful rides in all the route is that through the New River valley. The mountains are just low enough to be clad with verdure to the very top, and in the early spring every variety of green known to the mixer of colors can be seen, while the tones in autumn take on all the range from brown to scarlet.

These facts should be borne in mind by the traveler between the East and the West.

H. W. FULLER, *Genl. Pass. Agent, Washington, D. C.*

The Fastest and Finest Train in the West . . . .

IS

UNION PACIFIC — THE OVERLAND ROUTE — WORLD'S PICTORIAL LINE.

The Overland Limited

.....TO.....

UTAH and CALIFORNIA.

FROM 16 TO 20 HOURS
SAVED BY USING

"THE OVERLAND ROUTE."

Double Drawing-Room Pullman Sleepers.
Free Reclining Chair Cars.
Pullman Dining Cars.
Buffet Smoking and Library Cars.

Send for Descriptive Pamphlet "49-96," Folders and other Advertising Matter.
(Mention this publication.)

E. L. LOMAX,
General Passenger and Ticket Agent,
OMAHA, NEB

CALIFORNIA..

OF course you expect to go there this Winter. Let me whisper something in your ear. Be sure that the return portion of your ticket reads via the . . .

Northern Pacific-Shasta Route.

Then you will see the grandest mountain scenery in the United States, including **Mt. Hood** and **Mt. Rainier,** each more than **14,000** feet high, **Mt. St. Helens, Mt. Adams,** and others. You will also be privileged to make side trips into the **Kootenai Country**, where such wonderful new gold discoveries have been made, and to **Yellowstone Park,** the wonderland not only of the United States, but of the World. Close railroad connections made in Union Station, Portland, for Puget Sound cities and the east, via **Northern Pacific.**

CHAS. S. FEE,
General Passenger Agent, St. Paul, Minn.

Shortest Line
TO
St. Paul and Minneapolis
and the Northwest

CHICAGO
GREAT
WESTERN
RAILWAY

"Maple Leaf Route"

For tickets, rates or any detailed information apply to your home agent or write to

F. H. LORD,
Gen'l Pass'r and Ticket Agent,
CHICAGO.

THE CHICAGO, MILWAUKEE AND ST. PAUL RAILWAY

..RUNS..

Electric Lighted and Steam Heated Vestibuled Trains between **Chicago, Milwaukee, St. Paul and Minneapolis** daily.

Through Parlor Cars on day trains between **Chicago, St. Paul and Minneapolis.**

Electric Lighted and Steam Heated Vestibuled Trains between **Chicago and Omaha and Sioux City** daily.

Through Sleeping Cars, Free Reclining Chair Cars and Coaches between **Chicago and Kansas City, Mo.**

Only two hours from Chicago to Milwaukee. Seven fast trains each way, daily, with Parlor Car Service.

Solid trains between **Chicago** and principal points in **Northern Wisconsin** and the **Peninsula of Michigan.**

Through Trains with Palace Sleeping Cars, Free Reclining Chair Cars and Coaches between **Chicago** and points in **Iowa, Minnesota, Southern and Central Dakota.**

The **finest Dining Cars** in the World.

The **best Sleeping Cars. Electric Reading Lamps in Berths.**

The best and latest type of **private Compartment Cars, Free Reclining Chair Cars, and buffet Library Smoking Cars.**

Everything First-class. First-class People patronize First-class Lines.

Ticket Agents everywhere sell tickets over the Chicago, Milwaukee and St. Paul Ry.

F. A. MILLER,
General Passenger Agent, Chicago, Ill.

COMMENCED JANUARY, 1888. TWO VOLUMES PER YEAR.

THE AMERICAN GEOLOGIST,
1900.

The Oldest Exclusively Geological Magazine Published in America

TERMS.

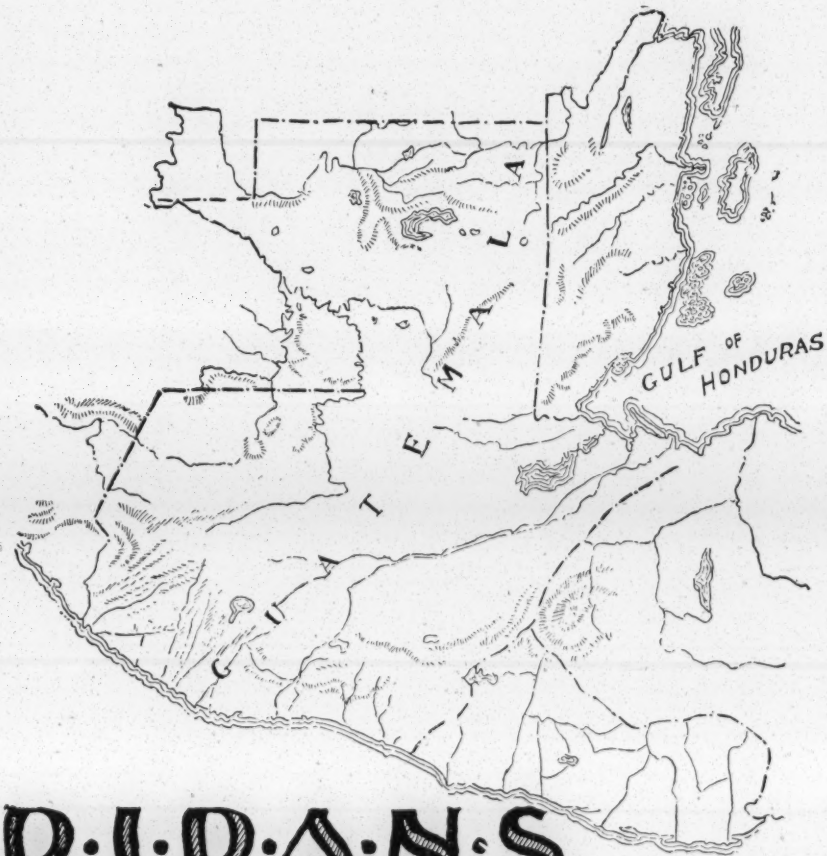
To Subscribers in the United States, Canada and Mexico..... **$3.50** a year
To other Subscribers in the Postal Union..... **4.00** a year

The ***AMERICAN GEOLOGIST*** is issued monthly from the office of publication at Minneapolis, Minnesota, United States of America. Twenty-five volumes are completed; the twenty-sixth began with the number for July, 1900. The magazine has received a cordial welcome and a generous support from leading geologists everywhere and it is now recognized as the exponent of the rapid geological progress that is taking place on the continent of North America, including Canada, the United States and Mexico. Nowhere else in the world are geologic phenomena exhibited on a more extensive scale and nowhere else are results attained of greater economic and scientific importance.

The ***AMERICAN GEOLOGIST*** lays before its readers from month to month the latest results of geological work. In addition to the longer papers it gives synopses of recent geological publications and brief notes on current geological events.

THE GEOLOGICAL PUBLISHING CO.,
MINNEAPOLIS, MINN.

Please mention this Magazine when writing to advertisers.



R·I·P·A·N·S

A practical journalist, long a member of the staff of the Washington *Evening Star*, resigned his position to go to Guatemala. Before he left Washington he had been a firm believer in the medicinal qualities of Ripans Tabules, and took a lot of them with him to Guatemala, where he earned the friendship of the captain of the steamer, which sails from San Francisco and stops at ports in Central America, by making known to him the marvelous virtues of R-I-P-A-N-S, the medical wonder of the century. He often dilates upon the captain's enthusiasm about the Tabules and asserts that the people of the tropics suffer terribly from indigestion, and that the Tabules are now known most favorably throughout Central America. Ripans Tabules quiet the nerves, compose the mind, allay irritation, and invite repose. One gives relief.

WANTED:—A case of bad health that R-I-P-A-N-S will not benefit. They banish pain and prolong life. One gives relief. Note the word R-I-P-A-N-S on the package and accept no substitute. R-I-P-A-N-S, 10 for 5 cents, or twelve packets for 48 cents, may be had at any drug store. Ten samples and one thousand testimonials will be mailed to any address for 5 cents, forwarded to the Ripans Chemical Co., No. 10 Spruce St., New York.

Henry Romeike's Bureau of Press Cuttings,

110 Fifth Avenue, New York,

Reads every paper of importance published in the United States, and through its European Agencies in London, Paris, Berlin, and Vienna every paper of importance published in Europe and the British Colonies. One subscription on any given subject will bring notices from the United States, and if desired also from the European papers.

WRITE FOR TERMS

Please mention this Magazine when writing to advertisers.

A VITAL POINT

"IMPROVEMENT THE ORDER OF THE AGE."

A TYPEWRITER'S PRINTING MECHANISM

MUST BE SCIENTIFICALLY CONSTRUCTED. THIS POINT IS OF UTMOST IMPORT FOR

EASY OPERATION AND PERFECT EXECUTION.

The Smith.. Premier Typewriters

Superior on This Point as Well as on All Others.

ONLY CORRECT PRINCIPLES EMPLOYED.

The Smith Premier Typewriter Co.,
SYRACUSE, N. Y., U. S. A.

Catalogues and Information at Washington Office, No. 519 Eleventh Street.

WOODWARD & LOTHROP

invite attention to their selections and importations in desirable merchandise for the present season, comprising in part

Paris and London Millinery, Silks, Velvets, High-class Dress Goods, Ready-to-Wear Outer Garments for Women, Girls and Boys, Hand-made Paris Lingerie, Corsets, Infants' Outfittings, Hosiery, Laces, Ribbons, Embroideries, Linens, Upholstery Goods, Books, Stationery, Card Engraving; also Paris, Vienna, and Berlin Novelties in Leather and Fancy Goods; Sterling Silver Articles, Lamps, Clocks, Bronzes, etc., for Wedding, Birthday, and Anniversary Gifts.

10th, 11th, and F Sts. N.W., Washington, D.C.

PEOPLE like to read about the great and wonderful country of the **Southwest**; of its quaint and curious towns, its ancient civilizations, its natural marvels. They like to get accurate information about **California and the Pacific Coast.** This is because most people want to some day see these things for themselves. . . . . .

A charming book covering these facts is issued by the

PASSENGER DEPARTMENT
OF THE
Southern Pacific Railway,

and will be sent to any one, postpaid, on receipt of **TEN CENTS.**

THE BOOK IS ENTITLED

"Through Storyland to Sunset Seas,"

You can get a copy by writing to

S. F. B. MORSE,
General Passenger Agent,
Southern Pacific,
New Orleans,

and sending **10 cts.** to defray postage.

AND IS A WONDERFULLY HANDSOME VOLUME OF **205** PAGES, WITH **160** ILLUSTRATIONS. . . .

The paper used is FINE PLATE PAPER, and every typographical detail is artistic. It is a story of what four people saw on just such a trip as you would like to make. . . . . .

Please mention this Magazine when writing to advertisers.

OUR BOOK DEPARTMENT

The Life of the Master

By Rev. JOHN WATSON, D.D. ("Ian Maclaren")

The author of "The Mind of the Master" and "Beside the Bonnie Brier Bush" has written a story of the life of the Saviour which will embody all that is told in the sacred records, along with such supplementary information as has been gathered by modern scholarship. The work is written in a style of charming sincerity and directness. It will contain double the amount of material which is at present appearing in McClure's Magazine. *In Press.*

Life of Napoleon Bonaparte

By IDA M. TARBELL

This is a profusely illustrated work, prepared with the aim of omitting no important Napoleonic picture. In the case of great paintings indispensable to a complete pictorial life of Napoleon, of which etchings or engravings were not obtainable, photographs were specially prepared; and in consequence the work is singularly complete on its pictorial side. Moreover, it contains one of the most readable short biographies of Napoleon anywhere in existence.

65th Thousand. Revised Edition, richly illustrated. *In Press.*

The History of the South African War

By A. CONAN DOYLE

This is the first important literary fruit of Mr. Doyle's army experience in South Africa. The author's painstaking methods in historical work are as well known to readers as his skill as a story teller, and his new history of the Boer War will for this reason possess unusual merit. *In Press.*

The Life of Abraham Lincoln

By IDA M. TARBELL

Drawn from original sources, and containing many speeches, letters and telegrams hitherto unpublished.

"A portrait that helps us to understand better than ever before the manner of man Abraham Lincoln was. . . . A narrative that is so intimate in its revelations as this of Miss Tarbell's helps us to realize that, with all his greatness, Abraham Lincoln was cast in the mold of our common humanity. . . . Her work presents a portrait of the man that no student of history can afford to miss, for it is very human, and does full justice to that homely side of Lincoln's character which has done more than anything else to give him a hero's place in the hearts of the common people."—*Brooklyn Eagle.*

New Edition, with 32 full page illustrations. Index. 2 volumes. 8vo, 6¼ x 9½. $5.00.

McCLURE, PHILLIPS & CO.

141-155 East 25th Street, New York

NATIONAL GEOGRAPHIC SOCIETY

OFFICES

Rooms 107, 108, Corcoran Building,
Fifteenth and F Streets N. W., Washington, D. C.
Office Hours: 8.30 A. M. to 5.00 P. M.
Telephone No. 471

President	ALEXANDER GRAHAM BELL
Vice-President	W J McGEE
Corresponding Secretary	WILLIS L. MOORE
Recording Secretary	A. J. HENRY
Foreign Secretary	ELIZA RUHAMAH SCIDMORE
Treasurer	HENRY GANNETT

Board of Managers

1898–1901	1899–1902	1900–1903
A. GRAHAM BELL	CHARLES J. BELL	MARCUS BAKER
HENRY GANNETT	G. K. GILBERT	HENRY F. BLOUNT
A. W. GREELY	A. J. HENRY	F. V. COVILLE
JOHN HYDE	DAVID J. HILL	S. H. KAUFFMANN
W J McGEE	C. HART MERRIAM	WILLIS L. MOORE
F. H. NEWELL	H. S. PRITCHETT	W. B. POWELL

The National Geographic Magazine is sent free of charge to all members of the National Geographic Society

TWO IMPORTANT BOOKS ON AN ABSORBING QUESTION.

The Trust Problem

By Prof. JEREMIAH W. JENKS, Ph. D.

This book is a comprehensive compendium of facts regarding industrial combi nations, their relations with the industrial world, their evils and the possible remedies for those evils. The information presented embodies the results of twelve years of painstaking personal investigation of large corporations by contact with their officers, employees, competitors, and the dealers in their goods.

With 5 charts in colors. Small 12mo. $1.00 *net.*

Corporations and Public Welfare

A collection of addresses recently delivered at the annual meeting of the American Academy of Political and Social Science in Philadelphia. Among the contributors are Prof. L. S. Rowe, Comptroller Bird S. Coler of New York city, Senator William Lindsay of Kentucky, Hon. John Wanamaker, President William H. Baldwin, Jr., of the Long Island Railroad, and Senator Nelson W. Aldrich of Rhode Island. The work of each writer possesses authority, timeliness, and weight. 12mo. $1.50 *net.*

McCLURE, PHILLIPS & CO.,

Publishers and Booksellers, 141–155 East 25th Street, New York.

THE
NATIONAL GEOGRAPHIC MAGAZINE

VOL. XI DECEMBER, 1900 No. 12

THE WYOMING FOSSIL FIELDS EXPEDITION OF JULY, 1899

By WILBUR C. KNIGHT,

Professor of Mining and Geology in the University of Wyoming

There has recently been a renewal of activity in collecting fossil remains in Wyoming. For a number of years, during the '70s and '80s, Wyoming was the most attractive field in the world for the student of vertebrate remains, and the collections then made include some of the rarest and most valuable known to science. From 1890 to 1895 little was done, but a revival occurred in 1897. Owing to the success of the American Museum of Natural History and the University of Wyoming in collecting remains of dinosaurs, Mr E. L. Lomax, general passenger and ticket agent of the Union Pacific Railroad Company, concluded that he could render a valuable service to the scientific world by organizing an expedition on a large scale for the purpose of collecting fossils and studying geology.

Mr Lomax began with the publication of an illustrated pamphlet, which gave in a brief way some information pertaining to the fossil fields and the restoration of some of the important animals that, long prior to the existence of man, inhabited what is now Wyoming. This pamphlet, together with an invitation to join the expedition, was sent in the spring of 1899 to every university, college, and museum of importance in the United States. The invitation included free transportation from Chicago to Laramie, Wyoming, and return, and allowed each institution one professor and one or two assistants. Unfortunately many scientific men had already planned their summer's work and were consequently unable to accept the invitation. Nearly one hundred men, however, availed themselves of this opportunity for study in the Rocky Mountains, and arrived at Laramie, as designated, on July 19.

Upon their arrival the visitors were conducted to the university, which President Smiley had thrown open as headquarters during their stay in Laramie. At noon luncheon was served on the university campus by the camp cooks, and many members of the party had their first experience of camp life. In the afternoon of the same day a permanent organization was effected, and, besides the usual officers, referees were elected for the leading branches of geology, paleontology, botany, zoölogy, and photography.

An unfortunate mistake had been made in connection with the shipping of the tents for the expedition, which were to have been ready for occupancy on the evening of the 19th. Luckily, however, the bedding was at hand, and the weary men were not loath to make up their beds and roll into them, taking their choice between the floor of the university and the campus.

The perfecting of arrangements for an expedition on so large a scale was no easy task, and it was late in the afternoon of the 20th before it was accomplished. That evening an informal reception was tendered the visitors in the university auditorium.

The following morning all were astir very early. Each man was busy selecting such things as he deemed necessary for the journey. The wagons arrived at nine o'clock, and by ten they were nearly all loaded and the leading team had started, heading west and north, across the Laramie Plains. Thus was inaugurated the largest expedition of the kind of which there is any record.

The men composing the party represented almost every State from the Atlantic to the Pacific and from Minnesota to Texas. Some of them had never before slept in a camp overnight, and were entirely unaccustomed to rough camp cooking; many had had no experience whatever of camp life of any sort. The journey from one end to the other, however, was marked by unselfishness, justice, and kindness, and the proverbial "kicker" was consequently unheard of.

It may be of some interest to know how the cooking was done and how the meals were served. The organization was divided into messes of ten men each, and with every mess there were three wagons—two for transporting the members of the party and one for conveying the food, beds, and tents. With each mess there were two teamsters and a cook, so that each formed in reality an independent party. The mess wagons were provided with the western "grub boxes," such as have been used on the plains and in the mountains for many years. The cooking was done on open fires and the baking in a Dutch oven

ON THE MARCH AT COOPER CREEK CROSSING

DIGGING FOSSILS — DUTTON CREEK

a shallow iron pot with a tight-fitting lid, that can be placed upon coals and also covered with them. The meals were served in "cowboy" style—*i. e.*, the whole of the food being cooked, it was arranged about the fire to keep warm, and each man, when the meal was called, took his plate, cup, etc., and helped himself, usually sitting on the ground to eat.

Not all who had accepted the invitation of the Union Pacific Railroad Company joined the main expedition. Representatives from the Kansas University, the Carnegie Museum, and the Field Columbian Museum went immediately to the dinosaur fields. The Northwestern University and William Jewell College parties hired teams and drivers and did their own cooking and camp work, while the Wheaton College party purchased a team and wagon and did its own driving and camp work. The three parties last mentioned were, however, with the main expedition most of the time for 20 days. The latter was composed of 86 men, but when the three semi-independent parties were present there was a total of 102 men.

The first day's march was to have been 20 miles, but through a misunderstanding on the part of the leading team it was extended to 25 miles, when camp was pitched near an alkali pond. It was very late; tents were put up with some difficulty, and supper was eaten after dark. It was an unpleasant beginning, and many felt it keenly.

On the following morning the head cook did not have to call "roll out" at 5.30, as he did in the days that followed. All were up by sunrise, and some even earlier, especially one, who, owning a Winchester, went to the pond before daybreak and, shooting at some ducks, sent a bullet singing over the camp. At breakfast there were many amusing discussions, which were continually interrupted by such questions as, "How did you sleep?" "Was your bed soft?" and other interrogatories relating to the new experience. Those who are unaccustomed to sleeping in tents or in the open air seldom sleep at all the first night out.

The second day's march was a very short one, and before noon the wagon train was winding down the old Government trail to Cooper Creek Crossing, where Camp No. 2 was established. Here there were shade, an abundance of good water, and, best of all, some fossiliferous bands of sandstone. Luncheon was served, and every man in camp armed himself with pick, ax, hammer, shovel, and sack, and hurried across the valley to a bluff less than half a mile away, where invertebrate fossils were to be found in abundance. In a short time the

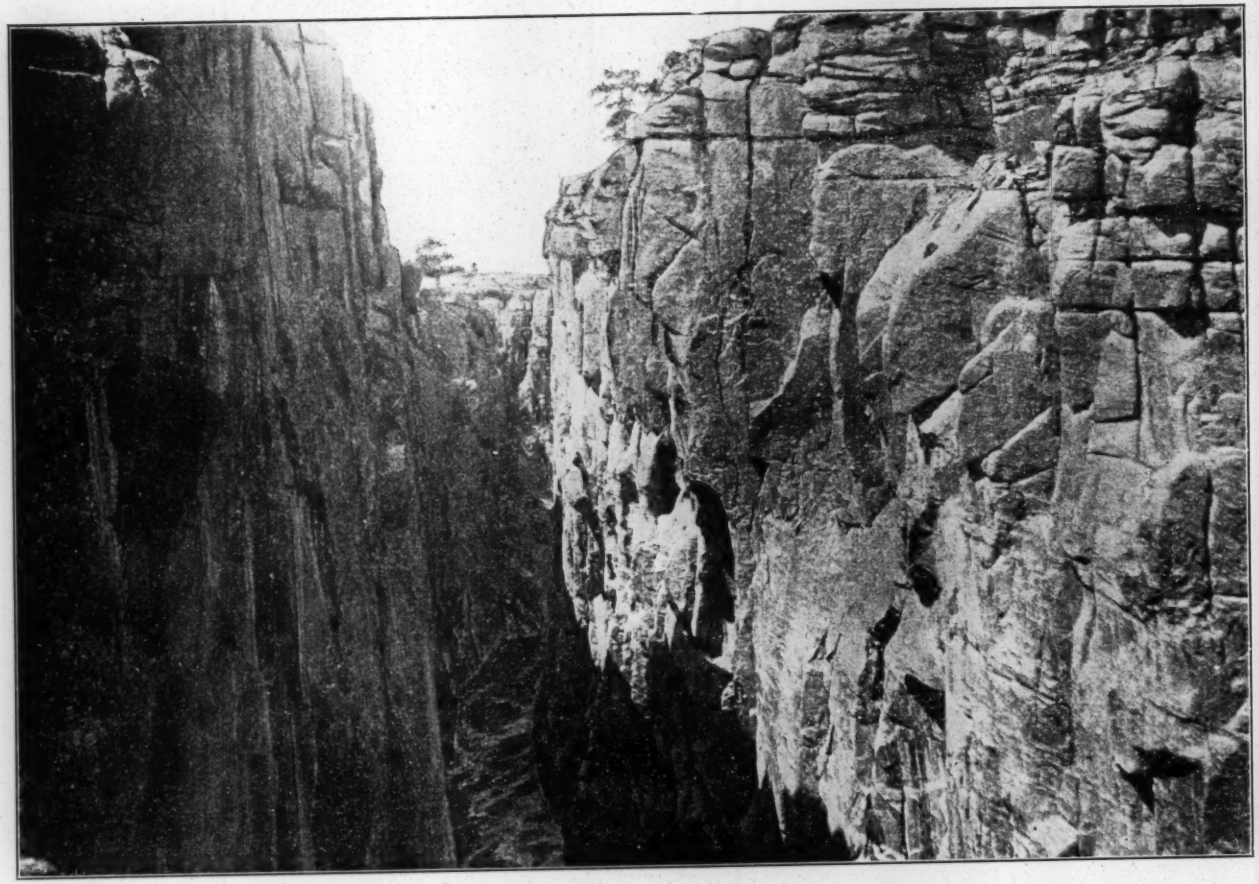
face of the bluff was nearly covered with collectors, and chips and fragments of stone were flying in all directions, to such an extent, indeed, that it was uncomfortable and almost unsafe to remain in the vicinity. The men labored long and hard, and, while most of them returned to supper, some became so enthusiastic as to forget their meals, until darkness compelled their return to camp. That night the camp fires along Cooper Creek burned brightly, and the stimulus gained by a successful afternoon's study and work engendered a feeling of mirth and jollity that broke forth in story-telling and college songs.

The next day being Sunday, camp was not moved. The wagons, however, were placed at the disposal of the members of the expedition, and many of them drove to the Medicine Bow Mountains, which were only five miles distant, and climbed to snow-line, played snowball, and wandered in the pine forest until they came in contact with an area of fallen timber, through which they did not wander to any extent. The sunshine and dry atmosphere had begun to tell on the noses and lips, and to some extent on the cheeks, of nearly all.

From Camp No. 2 the trail crossed Dutton Creek, passed some local coal-mines, and then followed down Rock Creek, where the topography reminds one more of an eastern valley than of a mountainous country. By the fifth day out the expedition had collected two tons of fossils, which were chiefly invertebrates and fossil leaves.

On the arrival of the expedition at Como Bluff, rendered famous by the work of the late Professor Marsh, enthusiasm was unbounded. It was from this locality that Yale University received its largest amount of dinosaur material. The bluff rises to a height of 200 to 300 feet, and parallels the Union Pacific Railroad for five or six miles, being south of the track, and nowhere over half a mile away. It is capped with conglomerate, and just below this band are the dinosaur beds of variegated marls and clays, plainly visible from passing trains. From these beds Professor Marsh secured his largest dinosaurs, which not only made him famous, but gave Wyoming the distinction of possessing geological graveyards containing fossil remains of the largest land animals that have ever inhabited the earth. The members of the expedition were successful in finding a great many dinosaur bones, and some opened quarries that gave promise of being very valuable. The time spent at this point, however, was so short that there was no opportunity to remove marls enough to investigate even partially the many finds.

FALLS IN THE GRAND CAÑON OF THE PLATTE



BURT CAÑON OF THE GRAND CAÑON OF THE PLATTE

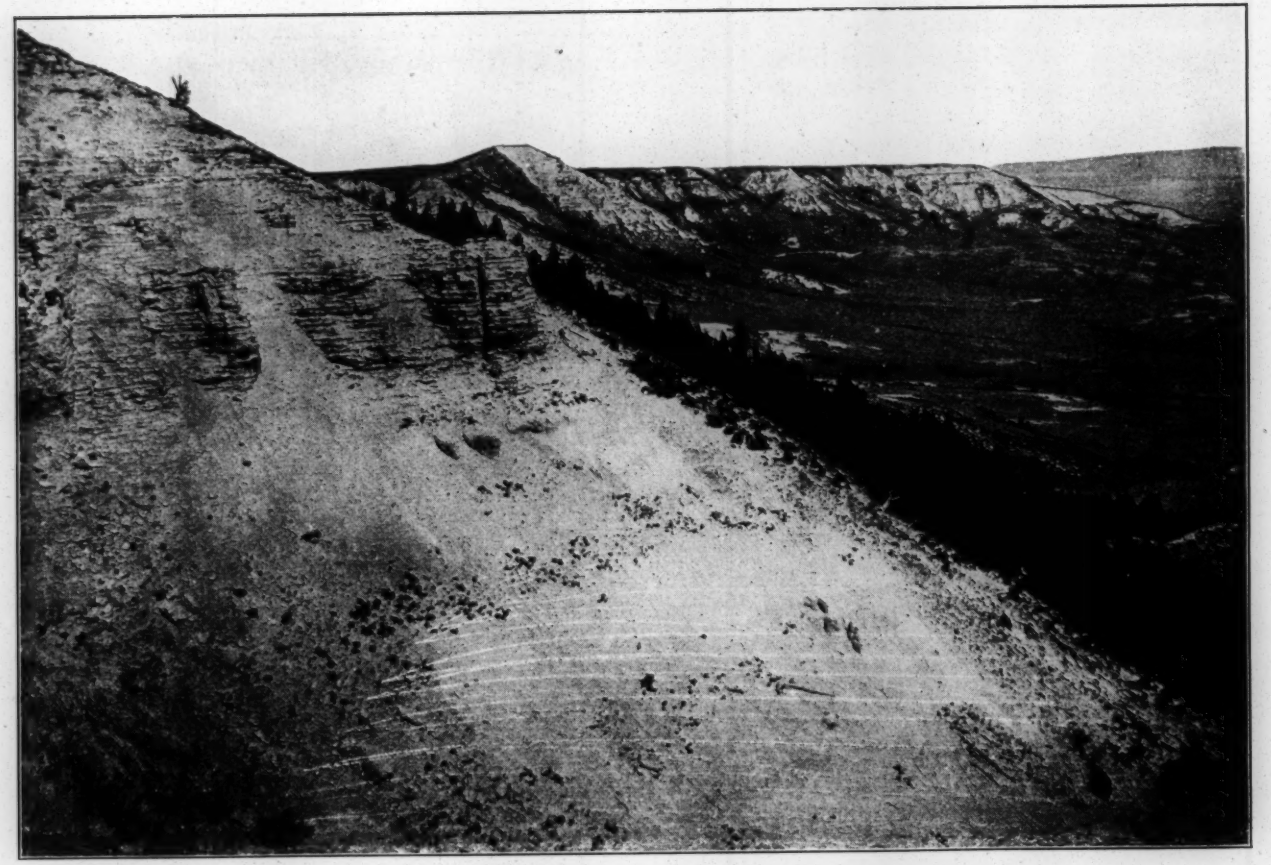
Most of the explorers were by this time beginning to feel anxious lest the Cañon of the Platte, the objective point of the expedition, would not be reached within the time available. The field-work was therefore curtailed and a march was made that followed the railway to Medicine Bow Station, beyond which the Medicine Bow River and the Little Medicine River were forded, and after one camp the Freezeout Hills were reached, which is a new locality for dinosaur collecting. Here the geologist and paleontologist found unbounded opportunities. The various bands forming the great fold in the Freezeout Hills were all uncovered, so that it was possible to study the entire section in minutia. Here were also the quarries of the National Museum, the Field Columbian Museum, and the universities of Kansas, Minnesota, and Wyoming. This being a comparatively new field and the dinosaur beds being exposed for a distance of 10 miles on each side of the camp, dinosaur hunting was the order of the day. Long before sunset on this never-to-be-forgotten 29th of July, men were returning to camp from every direction loaded down with bones; others were seeking teams to haul their heavier loads to camp, and though they worked diligently, it was nearly 10 o'clock before the last load of fossils was brought in. The next day's work unearthed a still larger quantity, the entire shipment from this point amounting to several tons.

The next camps were made in Shirley Basin, on Dry Creek, and the following one on Cottonwood Creek, which is only two or three miles east of the Grand Cañon of the Platte, and is the nearest camping ground convenient for a large party. The cañon had been the principal topic of conversation for several days, and now that we were approaching it, anticipation was at its height, and arrangements were hurriedly perfected for an early morning start. Every man was up in good time, and it is needless to say that no cameras were left behind. After less than an hour's walk the gorge was reached, and the party scattered, each bent upon the discovery of more magnificent views than were found by his neighbor. On that day not less than 500 plates and films were exposed.

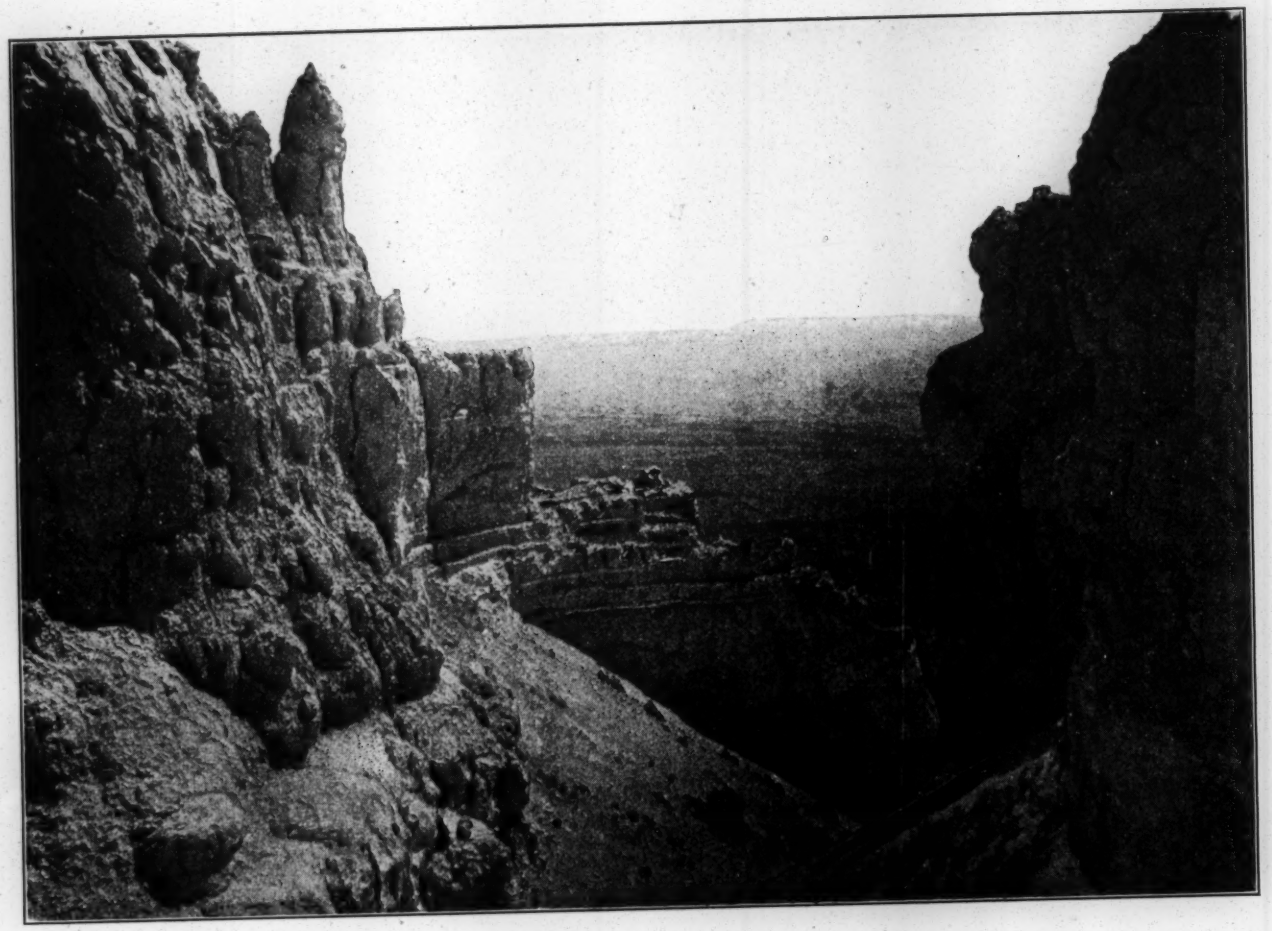
This magnificent cañon has never been described. It is hard to account for so perfect an example of a cañon having been passed by, alike by adventurer and scientist, when it is really the grandest piece of scenery to be found near the overland trail between Fort Laramie and Salt Lake. One of the famous camping grounds on this trail is not more than half a day's travel from the gorge, and many pioneers

must have kindled their fires within the sound of its warring waters. Frémont was the only man to mention it in any of the early exploration reports, and there are reasons for believing that he never saw the cañon proper. It was this cañon that Frémont, with five men, tried to pass in a boat. Recently in a conversation with Mr Thomas Sun, a pioneer of Wyoming, the following fact was learned: Descoteaux, who was Mr Sun's adopted father, was one of the men selected by Frémont to accompany him on the supposed perilous boat trip through the Grand Cañon of the Platte. Mr Sun states that Descoteaux often told him about Frémont attempting to run the cañon in a boat, and being swamped in the Sweetwater, long before the cañon proper was reached. To one familiar with the country this story has much greater weight than the one told by Frémont, in which he claims that he abandoned his boat in the main cañon. The cañon is now impassable by boat, except perhaps in very high water, and up to the present time there is no authentic record of any one having passed through it. It is about eight miles in length, and extends from the mouth of the Sweetwater River north and east nearly to Hot Springs Cañon.

The country about varies from rolling uplands to hills, and the cañon sinks so suddenly in the rocks that a mile away one would not anticipate such a gorge but for the sound of its roaring waters. At the place where the Sweetwater enters the main cañon the country is granite, and it remains so for several miles below. One of the very interesting spots in the granite area is about three miles below the mouth of the Sweetwater. Here the walls of the cañon rise almost perpendicularly to a height of 500 feet. The channel below is less than 50 feet in width, and above it is so narrow that even a person unaccustomed to the use of his left hand could easily throw a stone left-handed across the chasm. This is truly a dark cañon, for in many places the sun never reaches the bottom. The river rushes through these walls of granite on edge, with a deafening roar. From the water's edge to a height of about 100 feet the walls of the cañon are water-carved into great pits and projections, and in the highest of these we found remains of flood-wood, proving that the depth at high water must have been at least 100 feet. Below, in the river's path, are natural dams, made by huge masses of granite that the frost has wedged off from the walls. These dams produce rapids and falls through which no boat could pass. From the very narrow gorge the cañon widens, only to narrow again and then to widen out still more



WEST SIDE OF BATES HOLE



DARLOW GATE — EAST WALL OF BATES HOLE

at the point where the sedimentary rocks appear. These rocks are made up of red, brown, pink, and light-colored bands, through which the cañon has been carved, and here one is doubly impressed by the remarkable coloring and the great walls of lime and sandstone, that are nearly 1,000 feet in vertical height. As the river enters the sedimentary rocks it gradually widens, and the stream, that was less than 50 feet in width when passing the narrows, broadens out to about 300 feet as it leaves the cañon. Throughout the entire length of the cañon there are only a few places on the eastern wall where one can descend to the water's edge, and these are all very dangerous and should not be attempted by those unaccustomed to dizzy heights.

By climbing over huge blocks of stone, through dense underbrush, and along narrow, projecting ledges, where one has to cling by his finger-ends for fear of falling a hundred feet or more, one can enter the mouth of the cañon and occasionally reach the water's edge as far south as the sedimentary rocks extend. Here the walls and the water meet, as they do in most of the granitic portions. There is good evidence that several thousand feet of sedimentary rocks have been removed from the granitic area, so this is only the remnant of a greater gorge, whose walls were thousands instead of hundreds of feet high. The Grand Cañon of the Platte is one of Wyoming's finest pieces of scenery—a gem that has been passed by and a place destined in the near future to be one of the famous resorts of the Rocky Mountains.

Everyone was reluctant to bid farewell to Camp No. 9, on Cottonwood Creek, but the journey had to be resumed, and from now on it was toward Laramie, the trail following the rim of Bates Hole to Deadman Gulch, thence skirting the foot of the Laramie Mountains eastward.

Bates Hole is another instance where a region brimful of geographic and geological interest has been almost entirely overlooked. "The Hole," as it is usually called, was named after a hunter and trapper who formerly had his home there. In reality, it is a great valley that has been eroded out of the soft tertiary beds, and approximates 20 miles in length and from 6 to 12 miles in width. At its southern end this depression is 500 feet and at its northern end 1,500 feet deep. It is surrounded by tertiary rocks that are called "the rim;" but to the east, north, and west, and at some distance away rise mountain ranges varying from 8,000 to 10,000 feet in height. From the rim of this depression the slopes are very precipitous. In

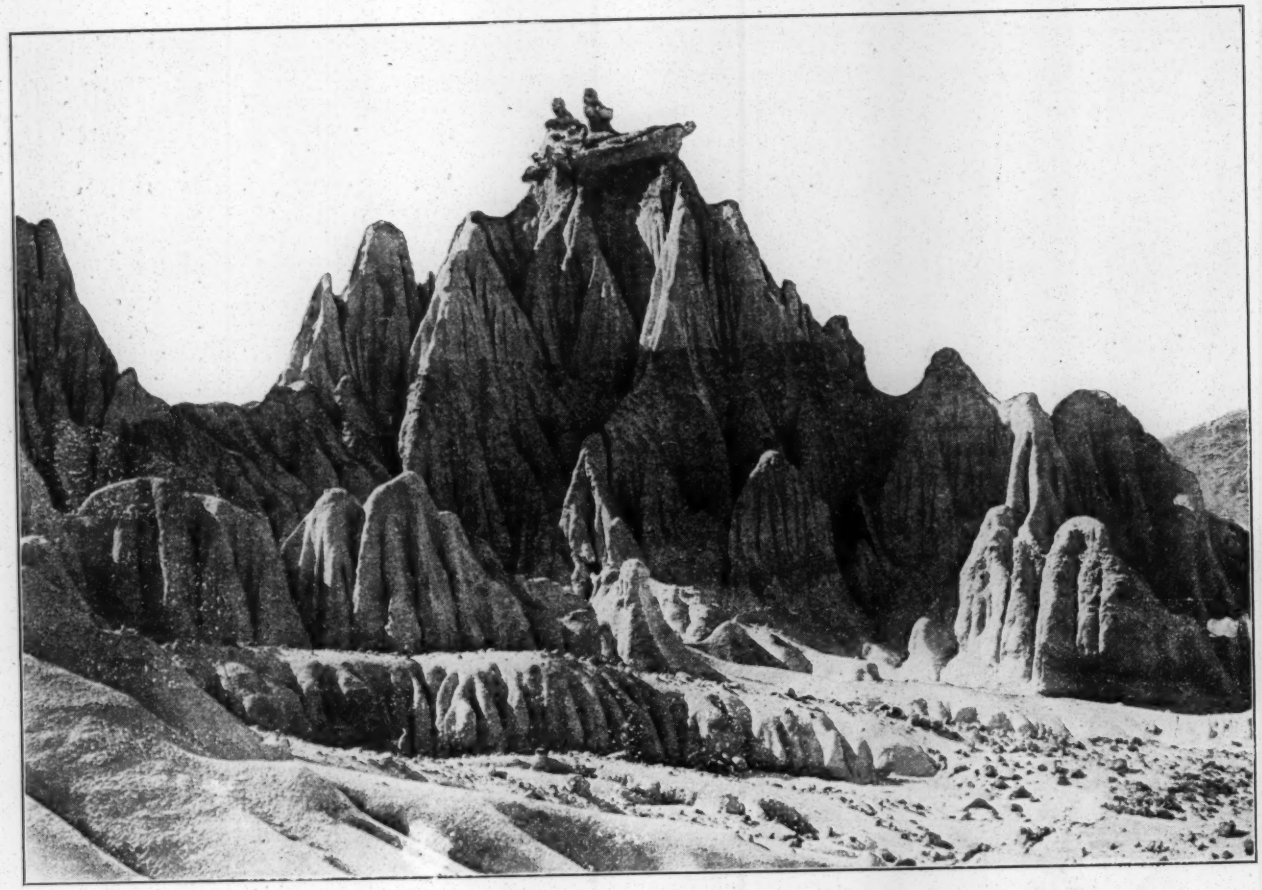
some places they consist of high terraces of castellated rocks; in others the clayey bands have been carved into normal earth slopes; occasionally there are areas covered with a scanty vegetation, and in a few instances groves of pine and spruce. So steep, in fact, are the slopes that for a distance of 20 miles there is but a single wagon trail leading into the valley.

Water is scarce, though one sees a few small streams, with their spruce-clad banks. These break the monotony of the desert and lend a peculiar charm to the entire region. About the "rim" of this great depression, especially on the eastern and western slopes, are some of the most wonderful examples of Bad Land erosion found in America. They are of huge dimensions, rising from a chalky slope to a height of several hundred feet and extending for miles. The carving is elaborate; columns, spires, arches, and gateways are numerous, and their embellishment would do credit to any sculptor. Narrow cañons, with perpendicular walls 200 feet in height, are common occurrences, and add greatly to the attractiveness of the scenery. Here and there are small forests of pine and spruce, and jutting out from their dark green foliage are the white castles whose forms are too varied and complex to admit of description. As the setting sun gilds these broken spires and crumbling walls, and the deepening shadows bring out vividly their intricate designs, it needs no effort of the imagination to see in them the ruins of an aboriginal city which has crumbled away, and whose only occupants are the mountain wolves and lions and their only guard the hooting owl by night and the screaming buzzard by day.

The journey along the Laramie Range was full of scientific interest and large collections of rock and minerals were secured. Laramie Peak, the oldest landmark in the Rocky Mountains, was scaled, and other places of note along the western flank of the Laramie Mountains were visited. After being in the field 39 days the expedition returned to Laramie all well and in the best of spirits. Although there were many in the party and but few acclimated, there was no serious sickness during the trip. No accident occurred and no delays were occasioned by breakdowns or the loss of horses.

The results of the work accomplished will appear from time to time in scientific journals, as the discoveries are worked up; but the discoveries themselves are not all that should be considered of value. The field experience has deepened the interest and broadened the horizon of every member of the expedition. Young and old were

TERTIARY EROSION NEAR BEAR CAÑON



CASTLE LOMAX

alike enthusiastic over the opportunities offered by this region for field-work in geology. While they returned to their various spheres of duty enriched with material for use in their future class-work, they all carried home with them that lasting benefit and stimulus which are derived from contact with the keen minds of those working along similar lines of research under more or less varying conditions.

The courtesy of the Union Pacific Railroad Company will long be remembered by every member of the expedition. In many cases it made attendance possible where otherwise the expense of a long railroad journey would have been a difficulty that could not have been overcome. It is to be hoped that other railroad companies will follow the example set by the Union Pacific and take some suitable opportunity of furthering the interests of science by facilitating research in some region of geographic and geological interest.

GOLD IN THE PHILIPPINES

By F. F. Hilder,

Bureau of American Ethnology

In an article which I wrote for the National Geographic Magazine in 1898 * I referred to the existence of gold in the Philippine Islands in the following terms:

"Gold has been found in several of the provinces, but chiefly in the more mountainous and inaccessible localities, many of which are occupied by independent tribes that have never submitted to Spanish rule; but that the auriferous formations extend over a wide area in the island of Luzon is proved by the fact that in the alluvial deposits of every stream on the Pacific side some color of gold can be found. The islands of Mindanao and Mindoro are also equally promising fields for prospectors of gold. In many places the natives have extracted considerable quantities of gold dust by washing the alluvial deposits; in others gold-bearing rock is broken by them with hammers and ground in rude mills, such crude methods, of course, producing but poor results."

During the present year I have again visited the Philippines, and, although existing conditions were such that I could not personally visit the gold-bearing districts, I was enabled to obtain considerable information with respect to them from sources which I consider to be thoroughly reliable, and have inspected a number of samples of

* National Geographic Magazine, vol. ix, No. 6, June, 1898.

gold obtained from different localities. In the island of Luzon there are few provinces in which gold does not exist in greater or less quantity, in veins and ledges in the mountains or in the river sands and alluvial deposits.

One of the best known auriferous districts is that of Paracale, in the province of Camarines Norte, on the eastern coast of Luzon, where in the spurs of the mountains many veins and outcroppings of gold-bearing rock have been uncovered, particularly at Pinagalatinan, Imbongimbong, and Lugos, near Labo. In the former places the gold is in combination with iron pyrites, with a trace of copper, blende, galena, and chromate of lead in orange-colored crystals. In Labo the streaks or veins are gray in color, containing gold, blende, iron pyrites, and sometimes, although seldom, native copper. The general direction of these strata is from north to south, except in Gumihan and Lugos mountains, in which the trend is to the northwest. The width of the veins is from 1 to 5 inches up to 26 to 36 inches. Foreman mentions this district as follows: *

"In the time of Pedro Manuel Arandia (1754–1759) a certain Francisco Estorgo obtained license to work these Paracale mines, and five veins are said to have been struck. The first was in the Lipa mountain, where the mine was called 'San Nicolas de Tolentino;' the second, in the Dobójan mountain, was called 'Nuestra Señora de la Soledad de Puerta Vaga;' the third, in Lipara, was named 'Mina de las Animas;' the fourth, in the territory of San Antonio, took the name of 'San Francisco,' and the fifth, in the Minapa mountains, was named 'Nuestra Señora de los Dolores,' all in the district of Paracale, near the village of Mambulao."

He also says: †

"Estorgo's neighbors, instigated by native legal pettifoggers in Manila, raised endless lawsuits against him; his means were exhausted, and apparatus was wanted to work the mines, so he abandoned them."

These mines are at present operated by the natives, but in such a rudimentary and desultory manner that only a small portion of the gold is saved. The workings are seldom carried to a greater depth than 3 or 4 meters, but it is a fact which promises better results, whenever more scientific and practical methods may be brought to bear on them, that the ore always becomes richer as the depth is increased; but in all the hundreds of years during which these deposits have been known it is safe to say that their true value has never been tested. The natives carry the ore to the surface in baskets, and when water

* The Philippine Islands, by John Foreman, New York, 1899, p. 380.
† Op. cit., p. 381.

is struck they bale it out with buckets, either pulling them up with a rope or carrying them up a bamboo ladder. The gold-bearing rock is emptied from the baskets into a concavity in a rock or large stone, which serves as a mortar. The pestle or stamp consists of a stone about 25 pounds in weight, which is tied with a strip of bejuco to the end of a slender pole, which is rested obliquely against the fork of a tree. The laborer, taking advantage of the elasticity of the pole, uses it like a trip-hammer, and crushes the rock. The broken rock is then pulverized in a rude mill, consisting of a rough stone roller, which is revolved in a circular base by means of buffaloes. The pulverized material is then washed, generally by women, until there remains only a dark sediment, which is afterward smelted by placing it in a shell, covering it with charcoal, and using a small piece of bamboo as a blowpipe.

A sample of the metal obtained by this imperfect process gave the following analysis:

Gold	77.94
Silver	19.00
Iron	.05
Silica	3.00
Loss	.01
	100.00

Of course, the quantity of gold obtained is a very small fraction of that carried by the ore, and as the gold is bartered to Chinese peddlers and ambulant traders, the producers get but small return for their labor and are miserably poor. The ground between the mountains and the coast is mostly alluvial, and the village of Mambulao, in this district, has long been noted for the placer washings in its vicinity.

In the adjoining province of Tayabas gold has also been found in the hills or mountains around the town of Altimonan; also in many of the spurs of the Caraballo mountains, in alluvial deposits in the Gapan country and in the sands of the rivers Ango and Angalacan, in the province of Nueva Ecija, and in many places in the Caraballo de Baler country between that province and that of Nueva Viscaya. On the island of Polillo, lying off the east coast, it has also been obtained from the shores of the river of the same name. In the north of the province of Cagayan it has been found in the districts around the town of Pamplona; in the townships of Lanag and Bangui, in the province of Ilocos Norte; in the sands of the river Abra, which

discharges near the town of Vigan, on the coast of Ilocos Sur. It has also been found in many places in the country inhabited by the Igorrotes and Igorrote-Chinese, in the district of Benguet, particularly near the villages of Gatapa, Bagnio, Capunga, Lutal, Automac, and Pangotcotan, near the latter of which some mines were worked by Mexicans during the last century; in the township of Batincoquin, in the north of Zambales province; in the rivers near the towns of Santa Maria and San Jose of Bulacan; in the Tierras de Caramoan, in the province of Camarines Sur; in the township of Ligao, in Albay; in the rivers of Lanating and Cayguran, in the province of Morong, and in the ravines and creeks of Macaburaboc and Camandag, near the town of Montalban, in the province of Manila. It will thus be seen that gold is widely distributed throughout the island of Luzon; how many of these deposits will prove to be rich enough to pay for systematic work and the introduction of machinery remains a problem which the future must solve, but I know that the owners of some of them are sanguine of securing good results whenever the country may be pacified and capital and labor shall be protected under American control.

In the great southern island of Mindanao gold has been found in many places, principally on the northern and eastern coasts, where its production has been entirely in the hands of the natives. What may exist in the interior is problematic, as the greater part of the island is unexplored. In the district of Misamis, in the northwest, there exist many alluvial diggings in the country between the Cagayan and Iligan Rivers. The principal placers are near the towns of Initao and Iponan, where nuggets have been found weighing as much as 1 to 2 ounces. In the neighborhood of Pigholugan, near Cagayan, small veins of auriferous quartz exist, from which, even by the crude native methods, considerable quantities of gold have been taken.

The gold-bearing district of Surigao may be considered as an eastern continuation of that of Cagayan de Misamis, and is of more importance, including the greater part of the district of the Canimon, Binutong, and the Canmarhat Mountain and the plains of Caningay. There are also deposits in Magong-Duangan and Danas, in the township of Caganan; placers in the township of Tibabangan, near Maquit, on the edge of Lake Sapongan; in the Tubay River, which discharges into the Bay of Butuan; also about four days' journey from the mouth of the Butuan River, near the villages of Lines, Finon, and Sulibas. In the veins and outcroppings in this district the gold is found mingled

with pyrites of iron and copper, galena, and blende. I have seen a report in which it was stated that in a ledge near Canimon there had been found ore so rich that as high as 100 ounces of gold had been obtained from 75 feet of the vein.

The productiveness of this Surigao district has been known for centuries, but for many reasons the extraction of gold has remained in the hands of the natives. Foreman says:*

"A friend of mine, a French merchant in Manila, told me, in 1886, that for a long time he received monthly remittances of 4½ to 5½ pounds of alluvial gold from the Surigao coast extracted by the natives on their own account. In the same district a Spaniard attempted to organize labor for gold, washing on systematic principles, but he met with such opposition from the friars, who influenced the natives, that he could only have continued his project at the risk of his life, so he gave it up"

Sir John Bowring also mentions the Mindanao gold production:†

"Gold dust is the instrument of exchange in the interior of Mindanao, and is carried about in bags for the ordinary purposes of life."

While I was in Manila in April last (1900) Mr G. E. St. Clair, a mining engineer and expert of considerable experience, returned from a trip to the southern islands. He said that from the result of his investigation he regarded the island of Mindanao as one of the richest countries he has ever visited, considered from a mineral standpoint.

Gold has also been found in the island of Panay. The most notable locations are those in the vicinity of Astorga, in the township of Dumarao, in the beds of the creeks known as Calaomin and Dinogo. In this neighborhood are found dioritic rock containing numerous small veins of gold-bearing iron pyrites, rich enough to pay for working. Deposits of gold exist in Binatusan and Lausam below Mantubang; also in the country between the junction of the rivers Manyon and Badbaran with the river Panay. In the province of Iloilo the most noticeable gold deposits are those in the Abaca section of the township of San Curique and those in the township of Baratoc Viejo, in the northeast of the island, which are reported to be very rich.

This description includes the best known gold-bearing localities; but indications in several other islands, such as Cebu, Mindoro, Masbate, Negros, Palawan, and other smaller islands, are such as to lead to the belief that the metal will be found in them whenever they may

* Op. cit., p. 382.

† The Philippine Islands, by Sir John Bowring, London, 1859, p. 279.

be explored and prospected. The reasons why the gold deposits in the Philippines have never been exploited or properly utilized are so many and so varied that no adequate relation of them can be given within the limits of a magazine article. Some of them are, however, summarized in the following extract from Foreman's book:*

"As a general rule, failure in most Philippine mining speculations, no doubt, was due to the unwillingness of the natives to coöperate with European capitalists, and in this they found encouragement from the friars, who were averse to innovation of any kind. The native, too, in rural districts, would not submit to constant organized and methodical labor at a daily wage, to be paid periodically when he had finished his work. The class of natives whom one had to employ in the neighborhood of the mines was nomadic and half-subjected, whilst there was no legislation whatever in operation, regulating the relations between workers and capitalists. Indeed, the latter were quite at the mercy of the former, whose indolence entirely overcame their cupidity, so long as their immediate necessities were satisfied." . . . "Again, the wretched means of communication provided by the Spanish Government obliged the few enterprising capitalists to spend their money on the construction of roads which had already been paid for in taxes."

It is to be hoped that after centuries of oppression, misrule, apathy, and neglect a better and brighter day is dawning for these beautiful islands, when their abundant stores of mineral and vegetal wealth will be developed and utilized, when both capital and labor will be encouraged and protected, not only in the interest of the former, but to the immeasurable benefit and advancement of the people who will supply the latter.

THE TEACHING OF PHYSICAL GEOGRAPHY IN ELEMENTARY SCHOOLS

By Richard E. Dodge,

Teachers College, Columbia University, New York

One of the perplexing problems of supervisors and superintendents of schools and of all others who have to plan and set in operation an effective school curriculum is that of determining the position of physical geography in elementary school work. Five years ago educational leaders were as a rule willing and indeed eager to incorporate almost any amount of physical geography in their school courses

* Op. cit., p. 384.

and to emphasize it even in the earliest years of school life. With the accumulation of experience and with the increased emphasis given in school work to the so-called "socializing" of the child, the tendency unfortunately has been to allow the pendulum of practice to swing far away from rational physical geography, until in many instances school geography has come to be, not "a study of the earth in its relation to man (and life)," but a study of man, with occasional reference to the earth.

There is no doubt that both extremes have been unfortunate, and that the cause of physical geography, as well as that of industrial geography, has suffered through over-advertising and exploitation. It will only be a question of time, however, when the interest of the moment, passing to some other subject in the curriculum, the pendulum will return to its normal position, and all phases of school geography will receive their due amount of attention, and no more.

In the mind of the writer, physical geography has a right to a large amount of consideration in elementary schools. It must not, however, be taught as an end in itself, but as a means to an end, and that end, in the upper grammar grades, should be the causal understanding of geographical conditions over the world. Physical geography also has a place in the work of beginners in geography; but its place is not all-important. It must be brought in slowly as an entering wedge that shall be driven deeper as needs may require during the succeeding years, but which shall not be driven "home," perhaps, until the later intermediate years.

There are a few guiding thoughts that one planning a course of study may well bear in mind, which seem to have their bearing on the vexed question under consideration. In the first place, neither the geographical expert nor the pedagogical enthusiast is necessarily qualified to decide upon the place and amount of attention that physical geography is to receive in the school curriculum. The geographer may think only of the scientific ordering of his subject-matter, and may be over-anxious to train embryo scientists rather than to train children scientifically, so that they will understand and think about the geographical conditions about them and be ready and able to seek for new information and fuller knowledge. The child may, in consequence, be top-heavy from an overload of scientific study of land forms and climate.

On the other hand, the teacher who believes that child study has already proved to us the supreme interests of children at all ages, or

who is convinced that "training for citizenship" or the study of "social dependence" demands the early emphasis of civics and a detailed study of industrial processes, may tell us that children have no interest in their relation to their physical environment; that they have but little need for the facts of physical geography (the stage) in order to understand human activities and progress (the play).

The leader in child study may very rightfully emphasize the need of being guided by children's interests and of making our school work serviceable. This does not mean, however, that we must follow children's whims or omit all that is not of immediate practical use in everyday life. It means that the interests of children must be ascertained, so that we may lead them forward from the unrelated known to the causally related known (or unknown) in such a way as to give them knowledge of important facts and principles and the ability to apply these facts and principles in everyday life. It means also the laying of the foundations of future culture by giving the children an insight into the unsolved problems of geography, and, further, it means training them "for citizenship" through making them logical and accurate in their thinking, open-minded toward the problems of the day, able to reach a decision and act on it with force and common sense. Physical geography introduced and developed with care, and gradually made the basis of other geography work, can do more than any other science that has a place in the elementary school curriculum in giving a training for intelligent citizenship.

The arrangement of the facts of physical geography in the elementary school must be decided by the scientist, the leader in child study, and the practical teacher working together. The scientist should determine the field to be covered and, in a general way, the order of steps to be followed in the work, and should see to it that the pupils receive training in accurate and scientific thinking; the child-study expert should be able to show how the selected facts may be used with the greatest effect and the least waste of energy on the part of teacher and pupil; and the practical teacher, who knows his children better than any one else, and who alone sees the practical possibilities, should select the details, arrange them so as to be of the greatest value and assistance in the development of the pupils, and yet so rationally that neither the pedagogical expert nor the geographer can offer valid criticism or rebuke.

The way will be made more easy if, so far as possible, in physical geography, as in other subjects, the children be led forward so gradu-

ally and systematically that need is developed for a fact or a principle before it is presented. Children should be led and not driven to the study of geographic controls. To follow such a progressive plan means in the early years a different method of study from that in the later years, when the children can work longer at a given task without variations, and when they can think more logically and consecutively. Whatever is done at any stage should be done in such a way that causes and consequences are necessarily related, though it is wise to remember that the consequences that deserve emphasis are not always the physical, but more often the human consequences following certain physical causes. In the earlier years pupils may study the consequences and gradually be led to see the fundamental causes of topography, climate, drainage, etc., that exercise a control over life. Such a plan rightfully followed should give good, practical mental training, should keep uppermost the human phases of the subject, and throughout a need may be created in the children's minds for a more thorough study of the causes in later stages.

Such a study of the physical facts in a somewhat extensive manner naturally follows, and in turn the elements of physical geography should be followed by a more full and careful study of the consequences of the present and past time, that can only be really appreciated as they are seen in the light of their environment. We might express it in some such way as this: that in the early years the children should be led to see some causal arrangement in the apparent chaos of physical, industrial, and social conditions with which they are always surrounded, thereby laying the foundations and the need for the study of pure science—the causes. After the causes have been elaborated as fully as time and the needs of the pupils allow, the pure science (physical controls) should be made the basis of work, so that the applied science (history, civics, and social conditions) may be taught understandingly.

It is not intended to imply here that present social conditions are entirely due to the physical environment, but that the physical environment should be given the emphasis due it in each case; that where physical controls are important, for instance, in determining a boundary, they be noted, and when politics have fixed a frontier, that the failure to follow the natural boundary be also noted and accounted for.

One advantage of such an inversion of the plan of procedure is the variation in method of study as the years go on. Geography in the

upper grades thus taught is not merely a duplication of the work of the earlier years, with more details to create work for pupils; it becomes more rich and more full of significance, and the method may be made so different that pupils hardly realize they are covering the same ground. Instead of the circle outside a circle, or concentric method, it may be said that a circle is drawn in the early years; that then the circle is turned inside out, like a glove, and that the later work is built around it.

Furthermore, such a plan allows the human conditions to be emphasized in the earlier years, when the children are as a rule interested in what people are doing. It should be noted, however, that they are also interested in *why* people do certain things, which is one of the reasons for leading from consequences out to causes. As soon as we can get a *why*, there is a logical reason for giving the causes, and our children are thinking ahead and creating a need for more and richer food. They cannot become parrots or mere absorbing sponges. Children do not ask *why*, however, until they have seen the fact to be explained, which suggests that the study of consequences should precede the study of causes in the early years.

The method briefly suggested as pertinent to the more advanced years, when properly put in operation, demands a use of physical geography that renders it unnecessary to have a special course in physical geography in the earlier high-school years. Many facts must, of course, be omitted that might be included in a first-year high-school course; but all the necessary physical controls of life may be studied scientifically and thoroughly, and made permanently of value through being applied and used in everyday school work, so that the scientific study of physical geography as such may be deferred until the later years of the secondary schools. Such a plan, furthermore, allows the best ideas of all leading schools of geography teachers to be woven together in such a way as to prevent one-sidedness, while ensuring good, thought-provoking work that is of practical, everyday value, and, further, that lays the foundation for later, better work. With such a plan, neither the physical geographer, the commercial geographer, nor the sociologist can rightfully claim that the pertinent facts of his field have been neglected until the children are dulled to their beauty and importance.

The working out of a course of study so that the attention given physical geography shall gradually be increased in amount and in significance as the years advance is not an easy task. From the

whole field of physical geography there must be selected those facts that are of the greatest value; these facts must be arranged so that progress is assured without over-repetition, and must be related to the conditions of which they are the causes, so that the knowledge of both causes and consequences is enriched through such a causal study. A course of study planned along these lines is now in operation in the Horace Mann School of Teachers College, and is proving itself rational and effective. The more important facts of physical geography are developed by the middle of the sixth year in school, as the natural outgrowth of a study of life conditions. In the remaining work of the geography course physical geography is made fundamental, and good history and good geography will result. By the end of the eighth year the pupils have gained a good insight into the earth sciences and have had such training in scientific thinking that no more geography work is advisable until toward the end of the secondary course. By the third or fourth year of the high school course it is possible to take up a study of physical geography that answers the requirements in physiography for entrance to Columbia and Harvard Colleges. Thus the arrangement of geography below the college, that Professor Davis has recently stated would be in fashion twenty or thirty years hence,* has been proved a very successful possibility. The primary essential of such elementary school work is that the teachers, who cannot be experts in all things, shall at least know more geography than their pupils are expected to know on entrance upon a secondary course. This necessity may be acquired at the end of another generation, but progress will unfortunately be slow.

GEOGRAPHY AT THE BRITISH ASSOCIATION

Geography occupies a much more conspicuous place in the proceedings of the British Association for the Advancement of Science than in those of the American Association. There is never any lack of valuable papers to be presented, and almost every meeting has its special attraction in the fact that some newly returned explorer avails himself of the opportunity of narrating before a large and distinguished audience the story of his discoveries and adventures.

* Physical Geography in the High School, School Review, Sept. and Oct., 1900.

The Bradford meeting of 1900 formed no exception to the rule, being one of the most successful in recent years, both from the popular and scientific standpoints. A large audience greeted the president of the section, Sir George S. Robertson, of Chitral fame, when he rose to deliver his address on Political Geography and the Empire, while still larger audiences thronged the hall when Mr C. E. Borchgrevink gave his description of the British Antarctic Expedition of 1899–1900, the first expedition that ever wintered on land within the Antarctic circle, and Captain H. H. P. Deasy described the incidents of his great journey in central Asia.

Of the miscellaneous papers, two, at least, had an interest extending far beyond the audiences to which they were primarily addressed. The first place, from an American standpoint, should be given to Mr G. G. Chisholm's paper on Some Consequences that may be anticipated from the Development of the Resources of China by modern Methods. The author pointed out that China is the only region in the world with all the means for industrial development on a gigantic scale that remains to be opened up. The countries that have been opened up within the past thirty or forty years have none of them possessed great resources for industrial development. Among the important results that may be expected to follow the adjustment of the present disturbed conditions in China the author mentioned:

1. A rise in prices in China, especially in the industrial regions.

2. The creation of a demand for foodstuffs not likely to be supplied by China itself, a demand which in itself will be one of the most powerful causes contributing to maintain the rise in prices.

3. The imparting of a great stimulus to the food producing regions most favorably situated for meeting this demand, more particularly Manchuria, Siberia, and western North America, probably the Pacific States of North America to a greater extent than Canada.

4. Perhaps the most important of all, the creation of a tendency to a gradual but prolonged rise in the price of wheat and other grains all the world over, thus reversing the process that has been going on since about 1870 in consequence of the successive opening up of new countries.

Another important paper, read by Mr T. G. Rooper, one of Her Majesty's inspectors of schools, dealt with the Progress of Geographical Instruction in Elementary Schools. The following, he said, were the principal defects in the existing methods of instruction: (1) Lessons in geography were not based on object teaching, nor on the

observation of local features and scenery; (2) the art of "reading" maps was not taught, nor was the construction of a map led up to by making plans of short walks and diagrams of the neighborhood; (3) the study of political and commercial geography was not based upon the study of physical geography, neither were the details of geographical study connected as cause and effect. There was no attempt to present a country to the scholar as a connected whole, and the lessons consisted of lists of names and figures, at the best arranged in groups. The chief reforms consisted, said Mr Rooper, in the intelligent study of local geography through local maps and models, and in object lessons which explained the principles of physical geography. The reliefs and models led up to the art of reading maps and to the demand for better maps. Such lessons were an excellent introduction to reasoning, and proved how little there was that was purely arbitrary, even in the sites of towns and villages in the neighborhood, much less in the industries which were carried on in them. The symbols on wall maps were vague and meaningless unless a context and significance were given them by previous practice in the building up of local plans and maps. The scholar should be carefully taught how to translate the symbols back into the forms of nature which they inadequately represented. The value of graphic work in the teaching of geography was strongly emphasized. The mere copying and coloring of maps by the pupil was rather an exercise in drawing than in geography. Each map should be drawn to serve some definite purpose. It should disentangle from a complex whole some particular part which analysis brought to light, and illustrate it with precision and simplicity. Further, the sketch maps should proceed from the simpler to the more complex, and no map should be made of a country as a whole until the leading features had been dealt with separately, the constructive method being thus applied to the teaching of geography.

The delicacy of the instruments now used for the detection of earthquake disturbances was thoroughly appreciated by the audience to which Prof. J. Milne made the surprising statement that no fewer than 130 earthquakes were recorded at Shide, in the Isle of Wight, last year. Of these disturbances, 125 had suboceanic origins, the Pacific origins being, with the possible exception of one group, on the face or at the bottom of those remarkable "deeps" which are found along the eastern and western margins of that ocean. Professor Milne stated that as there are reasons for believing that each of the

earthquakes was accompanied by large mechanical displacements of solid materials, the safety of the deep-sea cable systems of the present and the future calls for the definite localization of the regions of most frequent and serious disturbance. Analysis of earthquake records has increased our knowledge respecting the rates at which motion is transmitted through the earth, and indirectly thrown new light upon the earth's rigidity. The distance of a place of origin from a given station can now be determined, either from the interval by which the preliminary tremors outrace the larger surface waves, or from the interval between the arrivals of waves which have traveled from their origin round the world in opposite directions.

Among other noteworthy papers to which only passing reference can be made were Mr E. G. Ravenstein's on Foreign and Colonial Surveys and on the Geographical Distribution of Relative Humidity; Dr H. R. Mill's on the Treatment of Regional Geography, which seems to have brought out a general expression of opinion that the most convenient unit for such descriptions is the county rather than the map-sheet, and Sir Thomas Holdich's discussion of Railway Connection with India. These, however, are only a few of the interesting topics to which the attention of the Section of Geography was directed, and it is impossible to look over the report of the proceedings without a feeling of regret that in our own American Association there is no separate section devoted to a science that alike on its physical, its economic, and its political sides is of the most profound interest and consequence to the people of the United States.

J. H.

DECISIONS OF THE U. S. BOARD ON GEOGRAPHIC NAMES

The following are the decisions rendered by the U. S. Board on Geographic Names at its eighty-sixth meeting, held October 10, 1900. The decisions rendered at the eighty-fifth meeting, held June 5, 1900, were printed in the NATIONAL GEOGRAPHIC MAGAZINE for August, 1900, pp. 329-330. All prior decisions, covering a period of about 10 years, are contained in the Second Report of the U. S. Board on Geographic Names, printed by Congress last May as Senate Ex. Doc. No. 472, 56th Cong., 1st session. The Board has no copies of this report; application should be made to Members of Congress.

Ansley; island in Swanson Harbor, Chatham Strait, S. E. Alaska. (Not Astley.)

Carmichaels; borough and post-office, Greene County, Pa. (Not Carmichael nor Carmichael's.)

Catlin Mill; creek, branch of Catharine Creek, Schuyler County, N. Y. (Not Catharine Mills.)

Chilson; lake, Essex County, N. Y. (Not Long Pond nor Paragon Lake.)

Cliff; point on southeastern shore of Pearse Island, Portland Inlet, S. E. Alaska. (Not Base nor Rose.)

Coatue; beach and point, Nantucket Harbor, Nantucket, Mass. (Not Bogue, First, nor Hanloetoe.)

Cone; mountain on east bank of Stikine River near the Alaska-Canada boundary. (Not Cane.)

Coskata; beach, life-saving station, and pond, Nantucket, Mass. (Not Coskaty nor Croskaty.)

Emmet; post-office, railroad station, and township, Nevada County, Ark. (Not Emmett.)

Entiat; river, Chelan County, Wash. (Not En-ti-at-kwa, Entiatqua, etc.)

Gravette; post-office and railroad center, Benton County, Ark. (Not Gravett.)

Green; point, the northern point of entrance to Pyramid Harbor, Lynn Canal, S. E. Alaska. (Not Pyramid nor Zelonoi.)

Gross; point, the west point of entrance to Orland River, Hancock County, Me. (Not Gross's, Leach's, nor Spark's.)

Katzehin; river tributary to Chilkat Inlet, from the east, S. E. Alaska. (Not Chkazhīn nor Katsehin.)

Labouchere; island at entrance to Labouchere Bay, Sumner Strait, S. E. Alaska. (Not Ship.)

Leake; township, Nevada County, Ark. (Not Lake.)

Lone; mountain on and near north end of Admiralty Island, S. E. Alaska. (Not Barlow.)

Maxey; pond, Nantucket, Mass. (Not Maxcy.)

Napean; point on southeast shore of Admiralty Island, S. E. Alaska. (Not Nepean nor Nepken.)

Nobadeer; pond, Nantucket, Mass. (Not Nebadeer, Nobadee, nor Nobodeer.)

Poaha; island in Mono Lake, Mono County, Cal. (Not Anna Herman.)

Pimnys; point, Nantucket Harbor, Mass. (Not Pimney's.)

Polpis; harbor and village, Nantucket, Mass. (Not Poadpis nor Podpis.)

Red Bay; mountain in northern part of Prince of Wales Island, S. E. Alaska. (Not False Mount Calder.)

Rheas Mill; township, Washington County, Ark. (Not Rhea Mills.)

Sail; island off False Point Pybus, Frederick Sound, S. E. Alaska. (Not Ship.)

Sanford; cove in Endicott arm of Holkham Bay, S. E. Alaska. (Not Sandford.)

Scull; islet in Young Bay, Stephens passage, S. E. Alaska. (Not Skull.)

Shimmo; point, Nantucket Harbor, Nantucket, Mass. (Not Abram nor Shemo.)

Spruce; island off Pybus Bay, Frederick Sound, S. E. Alaska. (Not Yelowy nor Yellowy.)

Starr Hill; township, Washington County, Ark. (Not Starrhill.)

Sumdum; island in Endicott arm of Holkham Bay, S. E. Alaska. (Not Sand nor Soundon.)

Trots; hills, Nantucket, Mass. (Not Trott's.)

Weweeder; ponds, Nantucket, Mass. (Not Weedweder nor Weeweder.)

Whitley; township, Crawford County, Ark. (Not Whitney.)

Wigwam; pond, Nantucket, Mass. (Not Toochka nor Toupchue.)

SOME SIGNIFICANT FACTS CONCERNING THE FOREIGN TRADE OF GREAT BRITAIN

Mr Michael G. Mulhall contributes to the June number of the *Review of Reviews for Australasia* an article on the subject of British trade, which presents some facts of far-reaching significance with great clearness and force. The article is summarized by the author in ten paragraphs, which are substantially as follows:

1. The weight of the merchandise annually imported into Great Britain has multiplied fivefold in forty years, averaging at present more than one ton yearly for each inhabitant.

2. More than half of the food supply of the United Kingdom is drawn from other countries, at an annual cost of about £5 ($24.33) per inhabitant.

3. The mean price of imported food is now only £12 10s. ($60.83) per ton, having fallen 20 per cent in the last twenty years.

4. Most of the imported food could be raised in England, but at much greater cost, to the detriment of the working classes.

5. The consumption of fiber in the mills of Great Britain has doubled in thirty years, and exceeds the aggregate consumption in France and Germany.

6. The importation of metals and minerals has grown elevenfold in thirty years, and the exports of hardware manufactures have doubled in value.

7. The consumption of manufactured goods imported from foreign countries has risen from 15s. ($3.65) per inhabitant in 1869 to 41s. ($9.98) in 1899.

8. The value of textile goods exported is less than it was thirty years ago, but the volume has risen 70 per cent.

9. The fall of prices has been a gain to Great Britain of at least £50,000,000 ($243,325,000) per annum.

10. The tendency of British trade points to a steady increase of food imports and of hardware exports.

THE recent dredging of the Dniester has rendered the river navigable by barges for a distance of 70 miles from its mouth, thus greatly facilitating the Odessa grain trade.

THE magnitude of the Norwegian fishing industry cannot be better illustrated than by the fact that, although the season of 1899 was one of the poorest on record, the catch included 34,500,000 cod and 136,600 tons of herring.

THE

NATIONAL GEOGRAPHIC MAGAZINE

AN ILLUSTRATED MONTHLY

EDITOR: JOHN HYDE

ASSOCIATE EDITORS

A. W. GREELY	MARCUS BAKER
W J McGEE	WILLIS L. MOORE
HENRY GANNETT	H. S. PRITCHETT
C. HART MERRIAM	O. P. AUSTIN
DAVID J. HILL	CHARLES H. ALLEN
ELIZA RUHAMAH SCIDMORE	CARL LOUISE GARRISON

ASSISTANT EDITOR: GILBERT H. GROSVENOR

VOL. XI—YEAR 1900

WASHINGTON
THE NATIONAL GEOGRAPHIC SOCIETY
1900

WASHINGTON, D. C.
JUDD & DETWEILER PRINTERS
1900

CONTENTS

	Page
The Philippine Islands and their Environment; by JOHN BARRETT	1
The Cape Nome Gold District; by F. C. SCHRADER	15
The Idaho and Montana Boundary Line; by RICHARD U. GOODE	23
The Copper River Delta; by E. D. PRESTON	29
Our New Possessions and the Interest they are Exciting; by O. P. AUSTIN	32
The Total Eclipse of the Sun, May 28, 1900; by F. H. BIGELOW	33
The Census of 1900; by F. H. WINES	34
Geographic Nomenclature; by E. W. HILGARD	36
Puerto Rico, not Porto Rico; [JOHN HYDE]	37
Geographic Literature (Hawaiian America, Casper Whitney; The Newborn Cuba, Franklin Mathews; Practical Exercises in Elementary Meteorology, R. DeC. Ward)	38
Correspondence	40
Some Geographic Features of Southern Patagonia, with a Discussion of their Origin; by J. B. HATCHER	41
Kite Work of the Weather Bureau; by H. C. FRANKENFIELD	55
Practical Exercises in Geography; by W. M. DAVIS	62
Professor Henry Allen Hazen	78
Geographic Miscellanea	79
British South Africa and the Transvaal; by F. F. HILDER	81
The History and Geographic Distribution of Bubonic Plague; by GEORGE M. STERNBERG	97
Ice Cliffs on White River, Yukon Territory; by MARTIN W. GORMAN	113
A Hunting Trip to Northern Greenland; by FULLERTON MERRILL	118
A Canal from the Atlantic to the Mediterranean	122
Diseases of the Philippines	123
Geographic Miscellanea	124
The Anglo-Venezuelan Boundary Dispute; by MARCUS BAKER	129
Korea, the Hermit Nation; by HARRIE WEBSTER	145
An Assumed Inconstancy in the Level of Lake Nicaragua; by C. WILLARD HAYES	156
The Isthmian Canal Commission	161
Helping Navigation	162
International Arbitration and its Possibilities	162
Railway Construction and Improvements	163
Where Exploration is Needed	163
Work in the Arctic and Antarctic	164
Geographic Literature (Contemporary History of the World, E. A. GROSVENOR)	165
Geographic Miscellanea	167
The Growth of Russia; by EDWIN A. GROSVENOR	169

Page

Influence of Geographical Conditions on Military Operations in South Africa; by W. A. Simpson..... 186
Apperception in Geography; by M. E. Kelton..... 192
Ice Cliffs on White River, Yukon Territory; by C. W. Hayes and A. H. Brooks..... 199
A German Route to India; by Gilbert H. Grosvenor..... 203
The Cuban Census..... 205
Geographic Literature (International Geography, H. R. Mill; North American Forests and Forestry, Ernest Bruncken; Tarr and McMurry's Geographies)..... 206
Geographic Miscellanea..... 208
The Road to Bolivia; by W. E. Curtis..... 209
The Colonial Expansion of France; by Jean C. Bracq..... 225
The Prevention of Hailstorms by the Use of Cannon..... 239
The U. S. Signal Corps in Porto Rico..... 243
Russian Railways..... 243
The Revolt of the Ashantis..... 244
Geographic Miscellanea..... 245
The Expansion of England; by Edwin D. Mead..... 249
The Road to Bolivia; by W. E. Curtis..... 264
The Chinese "Boxers;" by L. J. Davies..... 281
National Geographic Society..... 289
Grove Karl Gilbert..... 289
The Tsung-li-Yamen..... 291
Geographic Notes..... 293
Problems in China; by James M. Hubbard..... 297
China and Her People; by Harrie Webster..... 309
The National Geographic Society's Eclipse Expedition to Norfolk, Va.; by Marcus Baker..... 320
The Scientific Work of the National Geographic Society's Eclipse Expedition to Norfolk, Va.; by Simon Newcomb..... 321
Hydrographic Work of the U. S. Geological Survey..... 324
Railways, Rivers, and Strategic Towns in Manchuria; [Gilbert H. Grosvenor]..... 326
The First American Census of Porto Rico..... 328
U. S. Board on Geographic Names..... 329
Foreigners and Foreign Firms in China..... 330
Three Books on China (China: The Long-lived Empire, Eliza R. Scidmore; China in Transformation; Overland to China, A. R. Colquhoun)..... 333
The Colorado Desert; by David P. Barrows..... 337
The Chinese Paradox; by H. M. Watts..... 352
Colonial Government in Borneo; by James M. Hubbard..... 359
The Water Supply for the Nicaragua Canal; by Arthur P. Davis..... 363
Mrs Bishop's "The Yangtze Valley and Beyond;" by Eliza R. Scidmore. 366
Forest Reserves of the United States..... 369
The Great Wall of China..... 372

Page
Geographic Notes 374
Lessons of Galveston; by W J McGee 377
The West Indian Hurricane of September 1–12, 1900; by E. B. Garriott.. 384
Excavations at Nippur 392
Hunan, the Closed Province of China; by W. B. Parsons 393
The National Geographic Society: Address of the President to the Board of Managers 401
Through the Heart of Africa 408
Nansen's "Farthest North" Eclipsed 411
Geographic Notes 413
Proceedings of the National Geographic Society 415
The Samoan Islands; by Edwin V. Morgan 417
The Manila Observatory; by José Algué 427
The Limited Water Supply of the Arid Region; by F. H. Newell 438
Hurricanes on the Coast of Texas; by A. W. Greely 442
Africa the Largest Game Preserve in the World; by John B. Torbert 445
The Wyoming Fossil Fields Expedition of July, 1899; by W. C. Knight.. 449
Gold in the Philippines; by F. F. Hilder 465
The Teaching of Physical Geography in Elementary Schools; by R. E. Dodge 470
Geography at the British Association for the Advancement of Science; [John Hyde] 475
Decisions of the U. S. Board on Geographic Names 478
Significant Facts Concerning the Foreign Trade of Great Britain 480

ILLUSTRATIONS

Page

The Philippine Islands as the geographical center of the Far East (pl. 1)... 1
Section map of Golofnin Bay and Cape Nome gold fields..... 16
Part of Nome from the beach, looking northwest... 17
Beach, tundra, and hills, looking northwest from Nome.. 19
Snake River and Nome, from tundra, about one mile west of Nome..... 20
Diagram of triangulation for the control of the Idaho-Montana boundary. 24
Summit of Bitter Root Range, looking north from Ward Peak 26
Basalt Cañon, plains of Patagonia, showing remnant of a comparatively recent lava flow (pl. 2)..... 41
Basaltic wall in cañon of a tributary of Arroyo Gio, showing face deeply dissected by narrow, perpendicular chasms..... 45
Basaltic pinnacles, plains of Patagonia..... 46
Cañon of Rio Tarde, foothills of Andes 51
In the Drakenburg Range (pl. 3) 81
Kimberly..... 85
Bloemfontein..... 86
Pretoria—the club..... 89
Crossing the Umbelosi River, Swaziland..... 90
Typical Boer house and tent wagon..... 93
Kafir matrons..... 94
Map showing boundaries as claimed by Great Britain and Venezuela and as awarded by the Paris Tribunal (pl. 4) 129
The United States Venezuelan Boundary Commission, 1896-1897.. 139
The Paris Tribunal, 1899..... 141
A village in Korea, the Han River in the distance..... 146
Two Korean travelers 147
A house in Korea..... 149
A group of Koreans..... 150
Guardian of the Temple of the God of War..... 153
An example of Korean art 154
The great South Gate of Seoul. 155
Street scene in Johannesburg (pl. 5)..... 169
Ethnographic Russia in 1900 172
Chart showing growth of Russia in Europe from 1303 to 1645..... 175
Chart showing growth of Russia in Europe from 1645 to 1900. 178
Diagram showing successive advances of Russia toward India. 183
The Russian Empire in its geographical relation to Europe and Asia. . . 185
Railways in South Africa..... 188
Map showing railways constructed and proposed in Asia Minor and Persia. 202
Diagram showing population of Cuba by color..... 205
Diagram showing proportion of those under ten years of age attending school in Cuba..... 205

Page
Diagram showing conjugal condition in Cuba 205
The harbor of Mollendo, Peru (pl. 6) 209
Opening pearl oysters, Panama 211
A Caballitos 213
A Panama laundry 214
A Central American family, Nicaragua 218
The most influential citizen of Arequipa 221
Transportation facilities of interior Peru 223
The geographic relation of France and her African colonies 223
Map showing military telegraph lines, military posts, ports of entry, and area of Porto Rico as compared with Connecticut 242
Geographical extent of the bubonic plague 248
Grove Karl Gilbert (pl. 7) 249
Descendants of the Incas 265
An Inca cemetery 267
Balsas on Lake Titicaca 270
Inca burial tower near Lake Titicaca 273
Bolivian soldiers 277
Bolivian miners 278
Membership of the National Geographic Society 288
Outline map of the Far East 290
Outline sketch of the city of Pekin 291
Map showing the country from Ta-ku to Pekin 292
The world's production of coal 294
Farthest north 296
Map of the Chinese Empire and Japan (pl. 8) 297
Buddhist priests—Amoy 301
Police court—Shanghai 302
Sampling tea—Shanghai 306
A typical Chinese village and canal 311
A cemetery at Chinkiang 317
A characteristic Chinese bridge 318
F. H. Newell 325
A group of Chinese farmers 331
Minister Conger 332
Map of northwestern China (pl. 9) 337
Map showing the Colorado Desert region 339
Land recently inundated along banks of Hardy River, the Cocopah Mountains in background 343
The crater of the Sierra Prieta 345
Mud volcanoes of the Hardy River, Colorado Desert 346
Cocopah winter house and basket granaries 350
In the gorges of the Yangtze 357
One of the main avenues of Shanghai 358
Forest reserves of the United States 370
The Great Wall of China 373

Page
Prince Luigi Amadeo of Savoy—Aosta, Duke of Abruzzi (pl. 10) 377
Chart No. 1, showing track of West Indian hurricane, 1900 385
Chart No. 2, showing track of West Indian hurricane, 1900 386
Chart No. 3, showing track of West Indian hurricane, 1900 389
Chart No. 4, showing track of West Indian hurricane, 1900 390
Map of eastern part of Hunan as delineated by Wm. B. Parsons 394
The Leiho 397
Chart showing membership of the National Geographic Society for each year since its organization 405
Captain Umberto Cagni 412
Astronomical observatory, Manila, P. I 433
Father Algué in his library 436
Map of Africa, showing territory within which the convention of May 19, 1900, places restrictions on the killing of wild animals 447
On the march at Cooper Creek crossing 451
Digging fossils, Dutton Creek 452
Falls in the Grand Cañon of the Platte 455
Butt Cañon on the Grand Cañon of the Platte 456
West side of Bates Hole 459
Darlow Gate, east wall of Bates Hole 460
Tertiary erosion near Bear Cañon 463
Castle Lomax 464

Burlington Route

PERSONALLY CONDUCTED
TOURIST PARTIES TO

California

Leave BOSTON every Tuesday
Leave CHICAGO every Wednesday
Leave ST. LOUIS every Wednesday

Comfortable and Inexpensive

SELECT PARTIES leave Boston every Tuesday via Niagara Falls and Chicago, joining at Denver a similar party, which leaves St. Louis every Wednesday. From Denver the route is over the Scenic Denver and Rio Grande Railway, and through Salt Lake City.

Pullman Tourist Sleeping Cars of a new pattern are used. They are thoroughly comfortable and exquisitely clean, fitted with double windows, high-back seats, carpets, spacious toilet-rooms, and the same character of bedding found in Palace Cars. They are well heated and brilliantly lighted with Pintsch gas. Outside they are of the regulation Pullman color, with wide vestibules of steel and beveled plate glass. Beautifully illustrated books on California and Colorado, with maps, train schedules and complete information can be had from any of the following Burlington Route agents:

E. J. SWORDS
379 Broadway
NEW YORK CITY

W. J. O'MEARA
306 Washington Street
BOSTON, MASS.

H. E. HELLER
632 Chestnut Street
PHILADELPHIA, PA.

F. E. BELL
211 Clark Street
CHICAGO, ILL.

C. D. HAGERMAN
703 Park Building
PITTSBURG, PA.

J. G. DELAPLAINE
Broadway and Olive Streets
ST. LOUIS, MO.

SOUTHERN RAILWAY

GREATEST SOUTHERN SYSTEM.

TO ALL POINTS SOUTH, SOUTHEAST, AND SOUTHWEST.

Through Pullman Drawing Room Sleeping Cars from New York and Washington to New Orleans, Memphis, Port Tampa, Jacksonville, Augusta, and Intermediate Points—First-Class Day Coaches—Dining Car Service.

Fast Trains for the SOUTH leave Washington Daily at 11.15 A. M., 9.50 P. M., and 10.45 P. M.

Through Tourist car on the 10.45 P. M. Train every Monday, Wednesday, and Friday for Texas, Arizona, and California points, without change.

Direct line to the Summer Resorts in Virginia and the Carolinas and the Winter Resorts of Florida, Gulf Coast, Texas, Mexico, and California.

Direct Through Car Line to and from Asheville, Hot Springs, and other Western North Carolina points—"THE LAND OF THE SKY."

For Map Folders, Summer Homes Folder, and Book on "ASHEVILLE AND THEREABOUTS" write to—

A. S. THWEATT, Eastern Passenger Agent, 271 Broadway, New York, N. Y.
J. C. HORTON, Passenger Agent, 201 E. Baltimore Street, Baltimore, Md.
L. S. BROWN, General Agent, 705 Fifteenth St. N. W., Washington, D. C.
W. B. BROWN, Passenger Agent, Norfolk, Va.

S. H. HARDWICK, Assistant General Passenger Agent, Atlanta, Ga.
C. A. BENSCOTER, Assistant General Passenger Agent, Chattanooga, Tenn.
W. H. TAYLOR, Assistant General Passenger Agent, Louisville, Ky.

J. M. CULP, Traffic Manager. W. A. TURK, General Passenger Agent, WASHINGTON, D. C.

The Mutual Life Insurance Co.

OF NEW YORK,

RICHARD A. McCURDY, President,

Is the Largest Insurance Company in the World.

The Records of the Insurance Department of the State of New York SHOW THAT The Mutual Life

Has a Larger Premium Income - - -	($39,000,000)
More Insurance in Force - - - - -	($918,000,000)
A Greater Amount of Assets - - - -	($235,000,000)
A Larger Annual Interest Income - - -	($9,000,000)
Writes More New Business - - - -	($136,000,000)
And Pays More to Policy-holders - -	($25,000,000 in 1896)

THAN ANY OTHER COMPANY.

It has paid to Policy-holders since its organization, in 1843, - - - $437,005,195.29

ROBERT A. GRANNISS, Vice-President.

WALTER R. GILLETTE, General Manager. FREDERIC CROMWELL, Treasurer.
ISAAC F. LLOYD, Second Vice-President. EMORY McCLINTOCK, Actuary.
WILLIAM J. EASTON, Secretary.

JUDD & DETWEILER, PRINTERS, WASHINGTON, D. C.